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Experiments on Learning, Methods, and Voting

Charles N. Noussair and Jason Shachat¹

This special issue appears at a time of confluence of two prominent trends in economics research: the increased embrace of controlled experiments with human subjects, and the rapid development within East Asian academia of western research practices. This latter trend is particularly profound in China with unprecedented public investment in top mainland universities. One such investment is the 985 program, whose mission is transform the top tier of mainland Chinese universities to levels comparable to the top universities of the West. One of the many achievements of the 985 program has been the establishment of the Wang Yanan Institute for Studies in Economics (WISE) at Xiamen University. WISE has taken the initiative in promoting experimental economics as a field in China. WISE has also established the Finance and Economic Experimental Laboratory (FEEL) in 2010, with the goal of having an impact on the field of Experimental Economics at the international level.

This impact is most readily seen in the annual International Workshop on Experimental Economics and Finance that is held at Xiamen University. This special issue includes seven papers from the third annual installment of this workshop, which was held on December 15-16, 2012. The papers are organized into three subgroups. The first two papers investigate learning in games using modern approaches, the next three papers introduce or break new ground in the application of innovative methodologies for conducting experiments, and the final two papers investigate behavioral models of voting using experimental approaches.

One of the more prominent lessons from experimental economics is that in one-shot strategic situations, Nash equilibrium is seldom played. However, in many games, repetition leads to play that increasing approximates, and often completely converges to, a Nash equilibrium of the stage game. Observation of this pattern has given rise to an extensive literature trying to identify what this learning process is, and how it depends upon the exact game being played and on the nature of player interactions. Feltovich and Oda, in the first paper of this issue, “The effect of matching mechanism on learning in games played under limited information,” study learning in coordination games. They consider a situation of incomplete information, where each player is given initial information about all players’ payoff functions. When they play, each player can observe his own payoff and the joint action profile. In this type of repeated environment, it seems intuitive that the learning process could depend on whether a fixed group repeatedly plays a game or whether players are randomly matched in each round from among a larger population. Indeed, in this study the matching protocol has a significant impact on which Nash equilibrium is reached in the coordination game and on the rate of convergence. One of the more significant findings is that play in coordination games converges more rapidly to a Nash Equilibrium with fixed pairs. Another finding is that fixed pairs are also more likely to converge to a more socially efficient Nash equilibrium. These two results together indicate that in this setting, fixed pair matching is more likely to generate socially desirable outcomes, but with the caveat that the play of an inefficient equilibrium can become more ingrained with pairs as well.

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One of the fundamental models of industrial organization is Bertrand competition, in which firms offer a homogenous product, produced with identical linear costs, and compete on price. The pure strategy Nash equilibrium calls for all firms to price at marginal cost, resulting in zero profit for each firm. However, this equilibrium is dubious as a predictor of actual play, because a firm can raise its price without losing any profit, while enjoying a chance to increase profit if the other firms raise their prices as well. Experimental and empirical studies robustly find deviations from equilibrium, with prices showing significant dispersion. In the second paper of this Issue, “Explaining price dispersion and dynamics in laboratory Bertrand markets,” Bayer, Wu, and Chan introduce a new class of learning models with the following features. Players form beliefs about an opponent’s action choice using a weighted fictitious play process. They use these beliefs to calculate expected payoffs for their own actions, and then choose their actions probabilistically according to a logit choice rule. An interesting aspect of this model is that it is a generalization of Quantal Response Equilibrium (McKelvey and Palfrey, 1995). Bayer, Wu, and Chan show that their generalization captures the pricing dynamics well and is thus an appropriate model when there is complete information.

In recent years, there has been increasing interest in documenting the biological correlates (such a gender, neurological activity, hormone levels, etc...) of individual decisions, particularly those over risky prospects. Nguyen and Noussair introduce the novel methodology of identifying emotional states and responses using face imagery analysis. They analyze the correlation between emotions and risk aversion. In the third paper of this issue, “Risk aversion and emotions,” the facial expressions of subjects over the course of an individual choice experiment, encompassing pair-wise lottery choices, are monitored and analyzed with face reading software. There is extensive work on the relationship between mood/emotions and the degree of risk aversion, but clearly no consensus. Nguyen and Noussair, through their use of the face reader technology, provide some evidence for these debates. With respect to emotional valence, they find a more positive emotional state correlates positively with tolerance for risk. With respect to specific emotions, they observe that the strength of emotions such as fear, anger, surprise, and happiness are all negatively correlated with risk tolerance. This study is a proof of concept that face reading can be a valuable tool for experimental economists.

Economists have long understood that cooperation is more likely to occur when individuals interact repeatedly rather than only once. However, two key components in theoretical models exhibiting this characteristic is notion that future payoffs are discounted and the number of repetitions is infinite. Experimental economists have recently made efforts to provide truer tests of such models by adopting a method of creating indefinitely repeated play. Indefinitely repeated play is created when at the end of each round of play, and random event like a die roll determines whether or not there is a subsequent round of play. Under appropriate assumptions about the separability of the utility of payoffs across rounds of play, the risk neutrality of participants, and the manner in which subjective beliefs are formed regarding the “dice rolls,” then this structure is comparable to an infinitely repeated game where the discount rate is constant. Tan and Wei use this methodology to study, for the first time, play in indefinitely repeated voluntary contribution games (VCM), a well-known social dilemma, in their paper “Voluntary contribution mechanism played over an infinite horizon”. In their experiment, they find some remarkable differences between the often-studied finitely repeated VCM and the indefinitely repeated version. Specifically, under indefinite repetition, there is no decay of average contribution levels, and there is an absence of the restart effect; Under finite repetition, new repeated games tend to start at high contribution levels even after players have previously experienced decay in a previous repeated game. Moreover, Tan

and Wei are able to identify a new interesting player type. There is often a leader who strives to establish cooperation, and then defects in an attempt to profit from others high level of contributions. This type of behavior was not identifiable in previous studies on indefinitely repeated prisoners' dilemmas, a simpler social dilemma, because of the coarser action sets in the prisoner's dilemma.

Since Holt and Laury's (2002) seminal experimental study on measuring risk aversion, there has been an explosion in the number of studies that use a choice menu (also known as a price list) protocol to measure individuals' preference parameters. The choice menu is a series of decision tasks between two alternatives, arrayed in such a way so that a given value of a preference parameter implies a unique switching point from one column to the other. The point of switching serves as a statistic for the individual's preference parameter. Breaban et al., in their paper "When do structured products become too good to be true? An experiment", investigate the use of such menus in the applied problem faced by individual investors choosing structured financial products. They show that using menus with increasing percentages of a guaranteed return results in a too-good-to-be-true choice anomaly. When the guaranteed returns exceed a certain point then subjects increasingly make stochastically dominated choices. However, when the items in the menu are randomly ordered, the anomaly does not appear. Furthermore, when the probabilities governing returns are more transparently presented, the anomaly also does not appear. This is an interesting study that documents the possibility of real problems in the implementation of a choice menu for financial decisions.

In political science, requiring supermajorities to enact important laws is recognized as important to protect minorities from the tyranny of the majority. In the sixth paper in this special issue, "Risk aversion, overconfidence, and private information as determinants of majority thresholds", Attanasi et al. consider the relationship between the majority threshold an individual prefers on the one hand, and her risk aversion level and her beliefs about whether she is in agreement with the majority opinion on the other. The experiment Attanasi et al. report has two treatments, which vary how much information is available about other voters' preferences. In the Info treatment, players observe a private signal about the distribution of outcome preferences, whereas under the NoInfo treatment, they do not observe the signal. There are two phases in each round of play. The first consists of a risk aversion measurement protocol. The second consists of choosing a preferred threshold and then measurement of beliefs about other players' preferences. The results show that in the Noinfo treatment, preferred majority thresholds are positively correlated with risk aversion and negatively correlated with overconfidence. In the Info treatment, a favorable signal about whether one is in the majority reduces the threshold demanded. Information reduces overconfidence in beliefs. This paper provides a microeconomic foundation for preferences for supermajorities, the fear of the tyranny of the majority, which ultimately has risk aversion and pessimistic beliefs at its core.

The paper by Kuo and Wang, entitled "The use of strategy methods in experimental pivotal voting game", considers a basic question in political science: why some people bother to vote and others do not. They revisit Levine and Palfrey's (2007) test of the model of Palfrey and Rosenthal (1983) in which voters have heterogeneous costs of voting. Kuo and Wang use the strategy method, which can directly elicit cutoff strategies, which take the form of cost thresholds below which an individual chooses to vote and above which she does not. They replicate Palfrey and Rosenthal's findings that a majority of individuals exhibit underdog and competition effects. The underdog effect refers to higher rate of turnout among members of a minority faction than among the majority. The competition effect is the presence of higher

turnout in a close election compared to one that is not close. Unlike Levine and Palfrey, however, Kuo and Wang, also find greater than Nash equilibrium levels of turnout. This paper is a good example of how the strategy method produces results that are typically congruent with those under direct response, but also how there are occasional differences that arise under the two elicitation methods.

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